

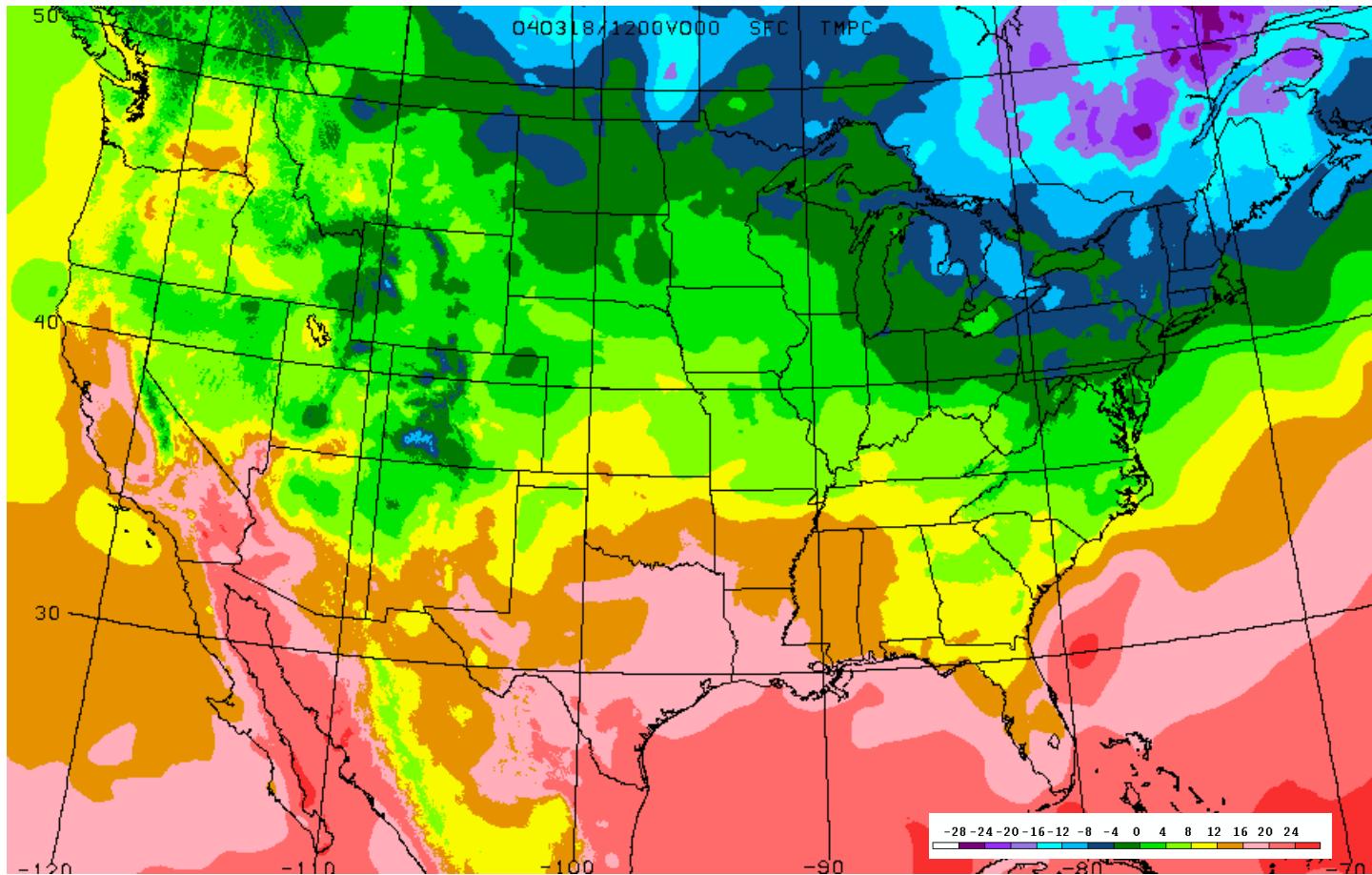
Real-Time Mesoscale Analysis (RTMA) and the Analysis of Record (AOR)

Western Region
Brad Colman, Sc.D.
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The RTMA/AOR Team

- NWS AOR IWT
 - Lee Anderson (co-chair), OST
 - Brad Colman (co-chair)
 - Fred Branski, OCIO
 - Geoff DiMego, NCEP EMC
 - Brian Gockel, OST MDL
 - Dave Kitzmiller, OHD
 - Chuck Kluepfel, OCWWS
 - Art Thomas, OCWWS
 - Al Wissman, OOS
 - Bob Glahn, MDL
- NCEP/EMC
 - Geoff Dimego
 - Maneul Pondeca
 - David Parrish
- NCEP/EMC (cont)
 - Ying Lin
 - Seung-Jae Lee,
 - Wan-Shu Wu
 - Stacie Bender
- John Horel, University of Utah
- Bob Aune, NESDIS
- Other partners and supporters:
 - NCDC, NESDIS
 - OAR, FSL, OST SEC
 - AMS

What is it? A comprehensive set of the best possible analyses of the atmosphere at high spatial and temporal resolution (hourly; 5-km grid) with particular attention placed on weather and climate conditions near the surface.



Program has three components

- Real-time Mesoscale Analysis (RTMA)
 - Hourly within ~30 minutes of nominal observation time
 - Initially a prototype, or proof-of-concept, for AOR
 - NCEP, GSD/ESRL, and NESDIS building first phase
 - Matures into quality real-time analysis component
- Analysis of Record
 - State-of-the-science analysis (best possible)
 - Delayed for late arriving data assets
 - Methodology to be determined (likely community effort)
 - Accepted ‘truth’ for use in studies and verification
- One-time-only reanalysis
 - Apply mature AOR methodology retrospectively
 - 30 year time history of AORs

Brief Background

- WR SOO/DOH IFPS White Paper recommendations to improve NDFD
- 2003: S&T Committee endorsed concept of NDFD-grid matching analyses of forecast parameters
- June 2004: Community summit to assess requirements and capabilities; USWRP and NWS OST sponsored meeting in Boulder
- August 2004: OST Director established MAC (Mesoscale Analysis Committee)
- October 2004: MAC recommended NOAA develop and implement suite of consistent sensible weather analysis products using current and future technologies:
 - Develop a strategy for prototype AOR or proof-of-concept (the RTMA -- Real Real Time Mesoscale Analysis)
 - Provide mesoscale analyses hourly and within 30 minutes of valid time
 - Pursue an archive-quality analysis (and complete historical re-analysis)

SOO/DOH IFPS White Paper recommendations:

- **Develop a national real-time, gridded verification system**
- Provide full-resolution NCEP model grids
- **Produce objective, bias-corrected model grids for WFO use**
- Implement methods to objectively downscale forecast grids
- **Incorporate climatology grids into the GFE process**
- Deliver short and medium-range ensemble grids
- **Produce NDFD-matching gridded MOS**
- Modify the GFE software to ingest real-time data
- Optimize ways to tap forecaster expertise

Local WFO Benefits of RTMA/AOR

- Provides current “state of surface weather” in a gridded format that can be used to:
 - Increase situational awareness
 - Images can be easily animated to show how weather is evolving
 - Date can be incorporated into forecast process – GFE/AWIPS
 - A logical starting point for short-term forecast updates
 - Improve forecaster real-time feedback and verification
 - Serves as gridded observation of record
 - Fills verification gap that will allow digital forecast process to mature
 - Enhance training and science
 - Use for case study and office drills -- WES case
 - Use for local research projects to improve local services and basic understanding of events

NOAA and NWS Benefits of RTMA/AOR

- Serves broader NOAA community
 - Climate applications
 - Fire Weather - burn models
 - Environmental and fisheries management
 - Air pollution and hazardous materials response
- Serves as ground truth for service validation and verification
 - NDFD verification
 - GPRA
 - Help refocus verification program on high impact services
- Serves as ground truth for science/service projects
 - Projects like Gridded MOS development
 - Helps NWS develop next generation high impact services
 - Snow and road temperatures below freezing
- Serves as long term record for model performance studies
 - NWP model development and BL scheme parameterization

Flagship NOAA product

- Addresses NOAA's mission to improve surface observation program and information resource
 - Acquire new surface observations – NERON
 - Distribute data and database - MADIS and GEOS
 - Integrate data into blended surface analysis – RTMA/AOR
- AOR provides comprehensive current state of the atmosphere
 - Provides information about weather between observation locations
 - Provides logical approach to integrate a variety of disparate observations and observation platforms
- Serves as a high profile NWS service
 - Valuable, easy to use, starting point for value-added sector
 - Helps users easily visualize current weather while filling in the gaps between obs
 - Gridded analysis can be used to produce images of current weather
 - media and weather information providers
 - Emergency managers, DOTs, etc.
 - Significant enhancement to climate record
 - Becomes basis for verifying sensible weather element forecasts within models by University and research groups

RTMA logistics and timeline

- Experimental grids are now complete
 - Hourly, 5-km NDFD grid, GRIB2
- EMC objective evaluation and comparison
- ISST conducting field assessment early CY2006
- Operational at NCEP Q3 FY2006
- Distribution of analyses and estimate of analysis error/uncertainty via AWIPS SBN as part of OB7 upgrade – end of FY2006
- OCONUS development with new system upgrade
- Archived at NCDC

Initial RTMA products

- Products transmitted hourly via SBN to AWIPS for field offices
 - Temperature (2 m)
 - Dew point temperature (2 m)
 - Wind (10 m, direction and speed)
 - Quantitative precipitation (Stage II)
 - Sky cover
- Also includes estimates of analysis error
 - Spatially and temporally varying
 - Reflects observation density, observation quality and background quality
 - Also reflects representativeness of observations
- Additional products (e.g., max. temp.) developed and provided later
- RTMA information archived at NCDC

RTMA Field Assessment

- ISST will work with EMC and Kirby Cook (WR) to distribute initial fields to test offices
- Grids will be displayable in D2D and ingested into IFPS/GFE
- Offices will provide feedback on pluses/minuses – i.e., help define the gap between this proof-of-concept and needed operational quality
- Several offices from each CONUS Region will participate
- Up and running around the first of year
- Results will feedback into EMC development
- Will provide test grids for developing gridded verification interfaces (BoiVer and FSL)

Second Component: Analysis of Record

- RTMA (improved version) will remain in place to support near-real-time needs of forecaster
- Considerable research, development, and operational infrastructure (computing) required for complete suite of analysis products of sufficient accuracy to verify NDFD
- Best possible analysis will require 3 or 4-DVar (EnKF?)
 - Model needed to move info through space & time – WRF
 - Analysis capable of using ALL observations – GSI
 - Later data cut-off to acquire all obs – 18-48 hours
 - Should use obs precip to drive evolution of land-states lower boundary condition
- Combination of 3D-Var and full-physics model requires substantial additional computing resources
- Initial steps started to address NWS AOR funding for FY 2008 and beyond, emphasizing NCEP (OSIP, PPBES, etc.)
- Additional funding sources need to be identified for broader community efforts to develop next-generation AOR